

Customer No.: 31561
Application No.: 10/709,055
Docket No.: 12404-US-PA

REMARKS

Present Status of the Application

This is a full and timely response to the outstanding non-final Office Action mailed on August 23, 2006. The Office Action has rejected claims 1-5 and 12 under 35 U.S.C. 103(a), as being unpatentable over Yamazaki et al. (USPAP 2002/0004292, hereinafter Yamazaki) in view of Tanabe et al. (USPN 6,861,614, hereinafter Tanabe). The Office Action has further rejected claims 6-11 and 13-17 were rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki and Tanabe in view of Jung (USPN 6,825,493, hereinafter Jung).

Applicants have amended claims 1 and 13 to more appropriately define the present invention. The amendments are well supported by the specification, for example, paragraphs [0035]-[0036] and Figures 5-6. After entry of the foregoing amendments, claims 1-17 remain pending in the present application. It is believed that no new matter is added by way of these amendments made to the claims or otherwise to the application.

After carefully considering the remarks set forth in this Office Action and the cited references, Applicants respectfully submitted that the presently pending claims are already in condition for allowance. Reconsideration and withdrawal of the Examiner's rejection are requested.

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Discussion of Office Action Rejections

The Office Action has rejected claims 1-5 and 12 being unpatentable over Yamazaki in view of Tanabe.

Applicants respectfully traverse the rejection for at least the following reasons.

The present invention teaches an apparatus for laser annealing an amorphous silicon film having a first region and a non-overlapping second region. The apparatus of the instant case includes substantially a laser beam source for providing a laser beam and a beam splitter for splitting the laser beam into a first laser beam and a second laser beam. The apparatus also includes a first photomask disposed on the optical path of the first laser beam and a second photomask disposed on the optical path of the second laser beam. The first photomask comprises a first pattern having a transparent region and a non-transparent region, while the second photomask comprises a second pattern having a transparent region and a non-transparent region. Further, the transparent region and a non-transparent region of the first photomask substantially align with the non-transparent region and the transparent region of the second photomask, respectively. Accordingly, the first laser beam is emitted to the first region of the amorphous silicon film, and the second laser beam is emitted to the second region of the amorphous silicon film after the first region is recrystallized. Ultimately, the process time is reduced and the throughput is increased.

Yamazaki, on the other hand, teaches irradiating the front of the semiconductor film with a primary beam and the back of the semiconductor film with a secondary film. First of all, the

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present invention teaches both the first and second laser beam emit to the front of the amorphous layer because the first and second photomasks are disposed in front of the amorphous silicon film. Yamazaki is completely silent about the application of a first and a second photomask on the pathways of the first and the second laser beams, respectively. Second, since the primary laser light and the second laser lights disclosed by Yamazaki emit to the entire front of the amorphous layer and the entire back of the amorphous layer, respectively, the primary laser light of Yamazaki, in essence, emit to both the first and second regions of the amorphous layer of the instant case. The instant case, however, teaches the first laser light emits only on the first region of the amorphous layer. Further, the front surface of the amorphous layer, on which the primary laser light of Yamazaki is emitted to, overlaps with the back surface of the amorphous layer, on which the secondary laser light is emitted to. The instant case, however, teaches that the first beam is emitted to the first region, and the second beam is emitted to the second region, which substantially un-overlapping with the first region.

Although the Office recognizes that Yamazaki fails to teach a photomask, and the placing of the mask in the optical path, the Office nevertheless contends Tanabe teaches the missing features. Applicants respectfully disagree.

Tanabe is directed to a system for forming a silicon thin film with a reduced trap state density by light irradiation. Although Tanabe may suggest the application of a photo mask, Tanabe fails to teach or suggest the application of a pair of photomasks, each being placed respectively in the pathways of a first and second laser beams. Further, Tanabe is completely

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silent about emitting a second laser beam to a second region of the amorphous silicon film that does substantially un-overlap with the first region, after the amorphous silicon film in the first region is recrystallized. Tanabe definitely fails to teach or suggests that the transparent region and the non-transparent region of the first photomask substantially align with the non-transparent region and transparent region of the second photomask, respectively. Moreover, Applicants submit that Tanabe is not reasonably pertinent to the particular problem with which Applicants was concerned. Tanabe is directed to reducing trap state density by light irradiation in order to improve the uniformity of a crystalline silicon thin film. The present invention is directed to reducing cost and increasing the throughput when a α -Si film is recrystallize to a poly-Si film. As such, as held in MPEP §2141.01(a) and the case law cited thereat, i.e., *In re Oetiker*, Tanabe cannot be relied on as a basis for rejection of the claimed invention.

At least for the forgoing reasons, even if Yamazaki is combined with Tanabe, the combination still fails to teach or suggest all aspects of claims 1 and 13 of the present invention. For at least the same reasons, dependent claims 2-5 and 12 patently define over the prior art as a matter of law, for at least the reason that these dependent claims contain all features of their independent claim. Accordingly, favorable consideration and allowance of the present application and all pending claims are hereby courteously requested.

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The Office Action rejected claims 6-11 and 13-17 under 35 U.S.C. 103(a), as being unpatentable over Yamazaki and Tanabe in view of Jung. Applicant respectfully traverses the rejections for at least the reasons set forth below.

With regard to the 103 rejections of claims 6-11 by Yamazaki and Tanabe in view of Jung, Applicants respectfully submit that these claims defined over the prior art references for at least the reasons discussed above.

In particular, Jung also fails to teach the application of two photomasks in the optical paths of different laser beams to crystallize different regions. Instead, Jung teaches the application of a single mask and the crystallization of the different regions of the substrate is accomplished by moving the mask, which is what the present invention is trying to avoid. In essence, Jung teaches away the instant case.

Further, since Jung simply teaches using a single photomask in the silicon crystallization process, Jung is silent about emitting a second laser beam to a second region of the amorphous silicon film, after the amorphous silicon film in the first region is recrystallized. Jung has further failed to teach or suggest the transparent region and the non-transparent region of the first photomask substantially aligns with the non-transparent region and transparent region of the second photomask, respectively.

Accordingly, even if there were motivation to combine the three references, the combination still fails to teach or suggest each and every element in claim 13. Thus, a prima facie case of obviousness for claim 13 has not been established by the Office Action.

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For at least the foregoing reasons, Applicant respectfully submits that independent claim 13 patentably defines over the prior art references, and should be allowed. For at least the same reasons, dependent claims 14-17 patentably define over the prior art as well.

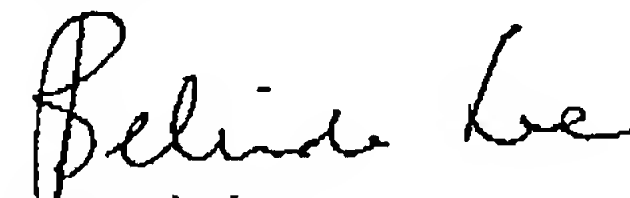
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CONCLUSION

For at least the foregoing reasons, it is believed that the pending claims are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

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Respectfully submitted,


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